Wildlife and Wildlife Habitat Mitigation Plan

Montana Hydroelectric Projects
Volume III - Hungry Horse Dam

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Montana Department of
Fish, Wildlife, and Parks

U.S. Department of Energy
Bonneville Power Administration
Division of Fish & Wildlife

November, 1984

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FINAL REPORT

WILDLIFE AND WILDLIFE HABITAT MITIGATION PLAN FOR HUNGRY HORSE HYDROELECTRIC PROJECT

January 1985

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Funded by

Bonneville Power Administration
Project No. 83-464

PREFACE

The Phase II document describes the proposed mitigation plan to protect and enhance wildlife and wildlife habitat due to construction of the Hungry Horse hydroelectric project in Montana. It discusses preferred mitigation measures as well as options which would provide satisfactory wildlife mitigation. The measures include protection, enhancement and management opportunities developed in accordance with the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (P.L. 96-501) and the Columbia River Basin Fish and Wildlife Program (section 1100) adopted in 1982 by the Northwest Power Planning Council. Operational impacts and mitigation strategies have not been included in this effort.

This plan specifically addresses mitigation for big game species (elk, mule deer, black bear, grizzly bear); aquatic furbearers (beaver, river otter, mink, muskrat); terrestrial furbearers (pine marten, lynx); mountain grouse (ruffed grouse, blue grouse); waterfowl and bald eagle. It is assumed mitigation for other target and non-target species impacted by Hungry Horse Reservoir will occur as secondary benefits.

This document (Phase II) follows the Phase I impact assessment report, which described the estimated wildlife losses attributable to construction of Hungry Horse Dam (Casey et al. 1984). The preparation of the Phase I and II documents was funded by the Bonneville Power Administration (contract No. 83-464).

Hungry Horse Dam was constructed primarily for hydroelectric generation although other purposes were cited (e.g. flood control, irrigation, navigability) to justify its authorization to Congress (P.L. 329). To date, no irrigation or navigability uses associated with the dam have occurred in Montana. Had the reservoir and dam been constructed for flood control alone, the facility would have been considerably smaller.

The area inundated by Hungry Horse Reservoir at full pool was considered the basis for the wildlife impact assessment. Because hydroelectric generation at Hungry Horse and downstream dams comprises the major benefit and requires filling the reservoir to full pool, wildlife habitat losses have been entirely attributed to the hydroelectric purposes of the facility.

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I. INTRODUCTION

A. HISTORY

Hungry Horse Dam and Reservoir are located on the South Fork of the Flathead River (South Fork) 5 miles upstream from its confluence with the mainstem of the Flathead River, 7 miles southeast of Columbia Falls, and 11 miles south of the west entrance to Glacier National Park (Fig. 1). This multipurpose project is situated at the top of the Columbia Basin power generating system and is used for both on-site power generation and water storage for downstream power generation. Water released from Hungry Horse Reservoir passes through an additional 19 hydroelectric projects on its way to the ocean. The dam is maintained and operated by the Bureau of Reclamation.

Construction of Hungry Horse Dam was authorized by Congress in 1944 under Public Law 329 (58 Stat. 270) primarily in response to a wartime need for power. The pool area was cleared under a series of logging and clearing contracts initiated during May 1947; all clearing was completed by September 1952. Construction of the dam began in 1948 and the dam was completed during July, 1953. Water storage was initiated in 1951 and the reservoir reached full pool in 1954.

B. RESERVOIR DESCRIPTION

Hungry Horse Dam is 564 feet high and 2115 feet long along the crest. The reservoir is 35 miles long and covers 23,750 acres at full pool. The maximum depth is 500 feet, and maximum storage (to elevation 3560) is 3,468,000 acre-feet. The reservoir lies at the foot of a 1,654-square mile drainage basin, which includes portions of the Bob Marshall and Great Bear Wilderness areas. Lands immediately adjacent to the reservoir are administered by the U.S. Forest Service, Flathead National Forest, including portions of the Hungry Horse and Spotted Bear Ranger Districts.

C. SUMMARY OF WILDLIFE AND HABITAT LOSSES

The reservoir inundated 38.4 miles of the South Fork and associated riparian and aquatic habitats, including diverse habitat features such as islands, gravel bars, sloughs, riparian shrubland, and mixed hardwood/conifer riparian forest (Table 1) (Casey et al. 1984:12). Mature forests of western larch (*Larix occidentalis*), Douglas-fir (*Pseudotsuga menziesii*), western white pine (*Pinus monticola*), and spruce (*Picea spp.*) on the benches and lower slopes were among the forest types logged and cleared from the pool area prior to inundation. Much of the valley had been influenced by fire; regular fires throughout the early part of the

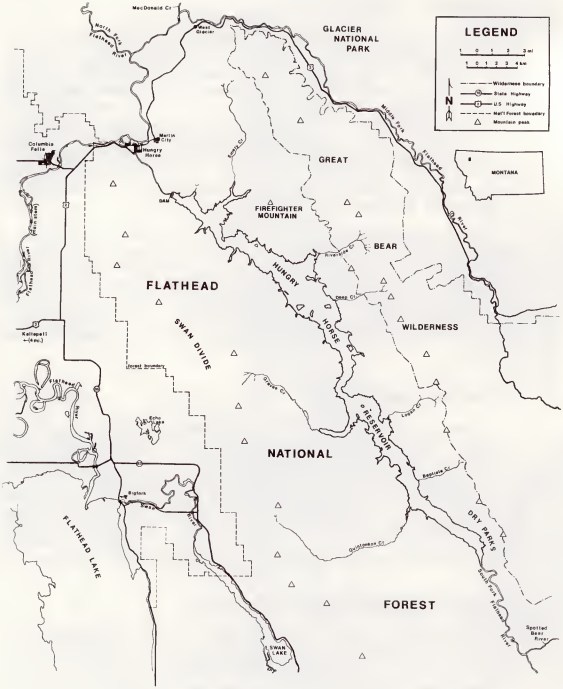

Fig. 1. Location of Hungry Horse Dam and Reservoir.

Table 1. Summary of the Habitat Mapping Units (HMU's) inundated by Hungry Horse Reservoir.

HMU	Acres inundated	Percent of total
Aquatic		
River/Stream	702	3.0
Pond/Lake	54	0.2
Marsh/Slough	144	0.6
Terrestrial		
Gravel Bar	375	1.6
Sub-irrigated Grassland	176	0.7
Deciduous Shrub Riparian	1,005	4.2
Deciduous Tree Riparian	100	0.4
Mixed Deciduous/Coniferous Forest	3,555	15.0
Upland Grassland		
Terrace Grassland	466	2.0
Other	168	0.7
Upland Shrub	5,713	24.0
Coniferous Forest		
Dense Seral Lodgepole Forest	229	1.0
Old Growth Coniferous Forest	560	2.4
Other	10,126	42.6
Talus/Eroded Slopes	70	0.3
Islands (N=32)		
Marsh/Slough	3	tr
Gravel Bar	157	0.7
Sub-irrigated Grassland	3	tr
Deciduous Shrub Riparian	72	0.3
Mixed Deciduous/Coniferous Forest	64	0.3
Old Growth Coniferous Forest	8	tr
TOTAL	23,750	100.0

century perpetuated unique habitat features such as mountain shrub stands on the valley walls and open shrubland succeeded by dense stands of lodgepole pine (Pinus contorta) on benches along the river. This mosaic of riparian and forest habitats supported a diverse wildlife community.

There were no mitigation efforts to offset losses of wildlife habitat or loss and displacement of wildlife populations within the reservoir area during the construction phases of the project. Though wildlife considerations are incorporated into the forest plan and timber management plans on the adjacent Flathead National Forest, no terrestrial wildlife habitat management plans specifically designed to mitigate project losses have yet been undertaken.

In Phase I (Casey et al. 1984), a target species list was developed to identify the primary species impacted by the project (Table 2). Acreages of the major habitat types were mapped and quantified using aerial photographic interpretation (Table 1). For each target species, the area of critical habitat impacted by the project was determined. From these data and the literature, qualitative and quantitative loss estimates were estimated for each of those species.

A summary of target wildlife species losses identified in Phase I is presented in Table 3 (modified from Casey et al. 1984: 55-56). As described in detail in the Methods Section, the target species losses have been converted to mitigation goals and are the basis for this mitigation plan.

Table 2. List of target species impacted by Hungry Horse Reservoir identified in Phase I (Casey et al. 1984).

Mammals

1) Big Game

Elk (Cervus elaphus)
Mule deer (Odocoileus hemionus)
White-tailed deer (O. virginianus)
Black bear (Ursus americanus)
Grizzly bear (U. arctos horribilus)
Mountain lion (Felis concolor)

2) Furbearers

Beaver (Castor canadensis)
Muskrat (Ondatra zibethica)
River otter (Lutra canadensis)
Pine marten (Martes americana)
Mink (Mustela vison)
Lynx (Lynx canadensis)
Bobcat (L. rufus)

Birds

1) Upland Game Birds

Ruffed grouse (Bonasa umbellus)
Blue grouse (Dendragapus obscurus)
Spruce (Franklin's) grouse (D. canadensis)

2) Waterfowl

Canada goose (Branta canadensis)
Mallard (Anas platyrhynchos)
Wood duck (Aix sponsa)
Barrow's goldeneye (Bucephala islandica)
Common goldeneye (B. clangula)
Common merganser (Mergus merganser)
Hooded merganser (Lophodytes cucullatus)
Harlequin duck (Histrionicus histrionicus)

3) Raptors

Bald eagle (Haliaeetus leucocephalus)
Osprey (Pandion haliaetus)

Table 3. Summary of loss estimates for target wildlife species impacted by the Hungry Horse hydroelectric project. Adopted from Phase I document (Casey et al. 1984).

Species (group)	Qualitative	Habitats Lost	Quantitative	
			# Animals	Acres of Key Habitat
Elk	High	Riparian and upland winter range	175	8,749 winter
Mule deer	Low	Spring (grassland) habitat and winter range	---	645 spring 3,844 winter
White-tailed deer	Moderate	Year-round habitat	---	---
Black bear	High	Year-round habitat (critical spring and fall foraging areas, denning sites)	36-45	22,994 total 5,585 riparian (denning, spring/fall) 5,713 upland shrubs (fall)
Grizzly bear	High	Year-round habitat (critical spring/fall foraging areas)	3-5	22,994 total 5,585 riparian (spring/fall) 5,713 upland shrubs (fall)
Mountain lion	Low	Year-round habitat for prey base deer,elk)	175 elk	8,749 elk winter range 3,844 mule deer winter range
Aquatic furbearers		Year-round aquatic habitats (food resources, denning sites, foraging areas,		38.0 river miles and 34.3 tributary miles
Beaver	Moderate-high		125	
Muskrat	Moderate		---	
River otter	Moderate		20-43	
Mink	Moderate			

Table 3. Continued

Species (group)	Qualitative	Habitats Lost	Quantitative	
			# Animals	Acres of Key Habitat
Terrestrial furbearers				
Pine marten	Low-moderate	Year-round habitat	---	14,542 conifer and mixed deciduous/coniferous forest stands
Lynx	Moderate	Dense lodgepole	---	229 dense seral lodgepole
Bobcat	Low	General habitat	---	---
Mountain grouse				
Ruffed grouse	High	Year-round habitat	---	518 deciduous shrub riparian 100 deciduous tree riparian 3,619 mixed deciduous/ coniferous forest
Blue grouse	Moderate	Breeding habitat	---	---
Spruce grouse	Moderate	Year-round habitat	---	10,923 coniferous forest
Waterfowl				
- Canada goose	Low			
- Mallard	Moderate		1,412	Nesting habitats (deciduous tree, riparian, deciduous shrub, riparian islands)
- Wood duck	Moderate	- Breeding, nesting and brood-rearing habitat		
- Barrow's goldeneye	Moderate			
- Common goldeney	Low		377	Brood-rearing (ponds, marsh, slough, grasslands)
- Common merganser	Moderate			
- Harlequin duck	Low-moderate			
Bald eagle	Moderate-high	Winter habitat	15 wintering	Not quantified
Osprey	Moderate (positive)	Increased nesting habitat		Not quantified

II. METHODS

A. MITIGATION OBJECTIVES

The quantitative and qualitative loss estimates described in the Hungry Horse impact assessment (Casey et al. 1984) were the basis for mitigation objectives. Because no wildlife mitigation has taken place for the Hungry Horse hydroelectric project, the estimated loss statements were directly converted into mitigation goals.

Quantitative loss estimates were usually expressed as numbers of animals impacted (i.e. 175 elk) and/or as acres of key habitats inundated. For these quantitative goals, the mitigation objective would be to replace either the animals lost through some type of habitat enhancement program or to "protect" key habitats equal in area to those key habitats lost. The term protection applies to lands potentially or actually threatened by degrading influences such as subdivisions, uncontrolled timber harvest, mining, and includes the acquisition of conservation easements or fee-title acquisitions.

B. DEVELOPMENT OF MITIGATION ALTERNATIVES

Many alternative mitigation projects were identified for their suitability and feasibility. Several factors were considered in this process. These included:

a) Benefits to the primary target species (highly impacted) and to endangered species;

b) Number of target species benefitted by implementation of an alternative;

c) Number of nontarget species benefitted by implementation of an alternative;

d) Consistency with the Montana Department of Fish, Wildlife and Parks (MDFWP) mitigation guidelines (Appendix A);

e) Consistency with the Northwest Power Planning Act of 1980 (P.L. 96-501) and the Northwest Power Planning Councils Columbia River Fish and Wildlife program (Northwest Power Planning Council 1982);

f) Consistency with the Northwest Power Planning Council's draft criteria for land acquisition;

g) Consistency with Montana's long-range wildlife planning program;

h) Comments received during interagency coordination.

Emphasis was placed on those projects which could benefit the greatest number of target species and/or the most impacted species. Alternatives which encouraged the maintenance, enhancement or creation of structural habitat diversity (i.e. shrubfields, deciduous tree, deciduous-conifer habitats) and, hence, wildlife diversity were also preferred.

Comments, received during an interagency coordination meeting held 24 May 1984, indicated a preference for habitat enhancement projects (to increase carrying capacities). For those projects where enhancement opportunities were not feasible, it was decided long-range habitat protection and management programs would be appropriate.

To determine where mitigation should occur, the state's mitigation guidelines were used (Appendix A). These essentially set the following priority for locating enhancement or long-term habitat protection projects:

1) Lands currently owned or managed by entities other than the state on which mitigation projects are compatible with current land management policies (i.e. Forest Service lands allocated to wildlife management),

2) Lands for which long-term management agreements could be developed via agency agreements, conservation easements, etc.

3) Lands for acquisition by conservation easement or fee-title.

Additional criteria focused on distance from Hungry Horse Reservoir using the following priorities:

1) Immediate vicinity of the reservoir or within annual range of the species affected,

2) Within the county or within a 50-mile radius of the hydroelectric project,

3) Within the corresponding Department of Fish, Wildlife and Parks administrative region,

4) Within Montana.

C. CREDIT FOR MITIGATION ALTERNATIVES

The overall mitigation objective is to replace all of the losses of target species attributable to the Hungry Horse Dam project. This shall be accomplished, where possible, by intensively managing appropriate lands to increase the carrying capacity for the species. Numbers of animals present at the

initiation of a mitigation project on lands selected for enhancement, do not contribute to replacement unless those animals are imminently jeopardized by a conflicting land use. Rather, replacement results from the increased carrying capacity and the associated production of "new" animals.

The degree to which carrying capacity can be increased is not known. Moreover, the potential will vary by species, present land use, habitat quality, and management intensity. No increases may be possible in some situations. For purposes of the analysis, it was assumed: 1) it is realistically possible to increase carrying capacity for all target species by one-third (0.33); 2) present densities are similar to those estimated for the South Fork drainage prior to impoundment; 3) replacement animals are the difference between the present density and a density value increased by one-third (0.33); and 4) the land area required to produce complete replacement of animal losses attributable to the Hungry Horse Dam project is calculated using the following equation:

$$X = A/C(0.33)$$

X = Unknown number of acres to be treated
A = Number of animals lost (target species goal)
C = Current density (animals/acre)

This equation essentially states that for each acre of habitat lost, approximately 3 acres require treatment to support the target number of species.

Each target species was evaluated, relative to those assumptions, to determine the degree to which enhancement would be feasible and would actually yield sufficient mitigation. Where the potential to increase carrying capacity was deemed inappropriate, alternatives entailing the protection of critical habitat (by conservation easement, fee-title acquisition or management plans) were sometimes proposed. Where acquisition by conservation easement or fee-title was specified, full credit on an acre-for-acre basis would be applied. Full credit would be given because these lands would contain high quality habitat characteristics and would be protected from present, as well as future, detrimental impacts.

III. RESULTS

A. ELK/MULE DEER

1) Introduction

The principal impact of the Hungry Horse project was the significant loss of elk winter range (8749 acres), which included mule deer winter range (3844 acres), and the loss of mule deer/elk spring habitat (645 acres) (Table 3). Based on the carrying capacity of historical elk winter ranges (0.02 elk/acre), this represented a loss of 175 elk and an unknown number of mule deer (0.02 elk/acre x 8749 acres = 175 elk).

2) Mitigation Objective

- Quantitative:

  - Increase winter range carrying capacity by 175 elk via enhancement of 26,119 acres of winter range, and protection or creation of 645 acres of mule deer spring range,

  -or-

  - Acquire 8,749 acres elk/mule deer winter range and 645 acres of mule deer spring range.

3) Mitigation Alternatives

To mitigate elk/mule deer winter range losses, one alternative would be to increase the carrying capacity of elk/mule deer winter ranges near Hungry Horse through various habitat enhancement and manipulation techniques. Alternatively, enhancement could take place elsewhere in northwest Montana. A third alternative is to protect 8749 acres of existing prime winter range through conservation easements or fee-title acquisitions. To mitigate spring range losses, the best alternative is to protect or create 645 acres of optimal spring-habitat types.

4) Recommended Alternative

The preferred mitigation project for elk and mule deer winter range losses is to implement a habitat enhancement program. This alternative is preferred because it replaces animals where they were impacted. In addition, this alternative would be more cost-effective than habitat acquisition.

This elk/mule deer winter range enhancement program would require long-term cooperative management agreements between land managing and wildlife agencies for the selected treatment areas. Long-term management agreements would extend for the life of the

Hungry Horse hydroelectric project and would include detailed habitat enhancement plans, retreatment schedules and monitoring requirements.

Depending on location and habitat characteristics of a winter range area, one of two enhancement approaches may be used. For winter ranges composed primarily of upland south and west aspects, the enhancement objective would be to create a mosaic of foraging areas (early successional stages) and cover areas (conifer cover). The reason for this approach is that significant proportions of these winter ranges have undergone plant succession due to fire suppression and have become dominated by various conifer forests. By increasing the foraging areas on these winter ranges (while also considering cover requirements), wildlife carrying capacities can be increased.

The second approach would apply to winter ranges located within or including riparian zones, creek bottoms, benchlands, foothills or kettle and kame topography. In these locations where snow accumulation is greatest, site-specific management plans might stress long-term maintenance of conifer cover necessary for thermal requirements in addition to the protection or enhancement of foraging areas.

Enhancement projects would take place within existing winter ranges either in proximity to Hungry Horse reservoir or within the Bob Marshall or Great Bear Wilderness Areas. Winter ranges adjacent to Hungry Horse Reservoir are shown in Figure 2. The South Fork winter range is located in the Bob Marshall Wilderness approximately 13 miles up the South Fork River from the Spotted Bear River. The Middle Fork winter range in the Great Bear Wilderness is located between Spruce Park and Granite Creek approximately 8 miles northwest of Dry Parks. These 2 proposed wilderness enhancement areas are not shown in Figure 2.

Winter ranges suitable for enhancement were prioritized based on relative importance of certain winter ranges and the need for enhancement (Table 4). All proposed winter range enhancement projects would primarily benefit elk and mule deer with the exception of the Lion Hill project. This project would primarily benefit white-tailed deer in lieu of mule deer.

Treatment programs to be applied to these winter ranges would vary depending on site specific terrain characteristics, soil conditions, stand age and stocking rates, cover/forage ratios, wilderness or non-wilderness status, and many other considerations. Examples of treatments include prescription burns, thinning units, specialized slash treatments such as underburns and broadcast burns, creation of small cutting units, and cover maintenance.

To mitigate spring habitat losses, the recommended alternative is to either protect or create 645 acres of optimal spring range habitat components in proximity to an elk winter range area.

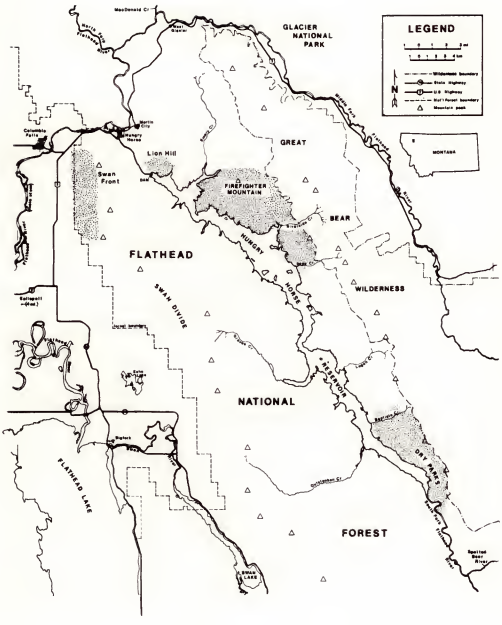

Fig. 2. Locations of elk/mule deer (or white-tailed deer) winter ranges outside wilderness suitable for enhancement.

Table 4. Rank, need for enhancement, potential productivity, size and, % mitigation for potential elk/mule deer (or white-tailed deer) winter ranges enhancement projects.

Rank	Location Winter Range	Need For Enhancement	Potential Productivity	Estimated Number of Acres	Percent Mitigation	Cumulative Percent Mitigation
1	Firefighter Mtn. to Deep Creek	High (high % conifer cover)	High (historical winter range for elk, mule deer)	10,000 - 12,000	38-46	38-46
1	South Fork Bob Marshall Wilderness	High (high % conifer encroachment)	High (important historical and existing winter range for elk, mule deer)	5,000	19	57-65
2	Middle Fork Great Bear Wilderness	High to Moderate (high % conifer encroachment)	High to Moderate (important historical and existing winter range for elk, mule deer)	5,000	19	76-84
2	Swan Front	Moderate (undergoing conifer encroachment)	High (important historical and existing winter range for elk, mule deer)	1,000 - 1,500	4-6	80-90
2	Lion Hill	High to Moderate (high % conifer cover)	High (important historical winter range for elk, white-tailed deer)	640-1,300	2-5	82-95
3	Desert Mt. and foothills	Moderate (winter range along lowlands in need of protection; uplands have moderate % conifer encroachment)	Moderate to High (important winter range, but use is not well documented)	2,000-2,500	8-10	100-115
4	Dry Parks/ Horse Ridge	Low to Moderate (dominated by shrub-fields with some encroachment lodge-pole on Horse Ridge)	High (very important existing winter range)	2,000-2,500	8-10	108-125

Protection or creation would entail obtaining a conservation easement or fee-title acquisition.

5) Mitigation Accounting

To meet the objective of increasing elk/mule winter range carrying capacity by 175 elk, a treatment acreage figure must be calculated. Using the formula for increasing carrying capacity by 0.33 percent, the treated area would equal 26,119 acres. This number is based on increasing the estimated current elk density (0.02 elk/acre) by 0.33 percent or 0.0067 elk/acre. Each acre considered part of an elk/mule deer winter-range treatment program would be subtracted from the total goal of 26,119 acres until the goal is reached. Other target species habitat enhancement or protection projects which would benefit elk or mule deer (or white-tailed deer in lieu of mule deer) would be accounted for in this process, also.

The proposed winter range project would satisfy mitigation for both elk and mule deer winter range losses. It is anticipated mule deer spring range losses would be mitigated through other proposed habitat protection plans such as those described for black bear and grizzly bear.

6) Other Species Benefitted

Implementation of the preferred project would potentially benefit mountain lion, pine marten, bobcat, lynx, black bear, grizzly bear and mountain grouse.

B. BLACK BEAR/GRIZZLY BEAR

1) Introduction

Hungry Horse reservoir inundated 22,994 acres of black bear and grizzly bear habitat resulting in an estimated loss of 36 to 45 black bears and 3 to 5 grizzly bears. Key habitat types included 5585 acres of spring and fall foraging areas (i.e. sub-irrigated grasslands, deciduous tree riparian, mixed deciduous/coniferous forest, deciduous shrub riparian) and 5713 acres of upland shrub (Tables 1 and 3).

2) Mitigation Objectives

- Quantitative:

  - Increase carrying capacities of the remaining black bear and/or grizzly bear range by 36-45 black bears and 3-5 grizzlies through enhancement of 75,000 acres,

    -or-

  - Acquire 11,298 acres of key grizzly bear and black bear habitats.

3) Mitigation Alternatives

To increase the existing carrying capacity for black bears or grizzly bears by the desired quantity, approximately 75,000 acres would require treatment. The mean number of black bears or grizzly bears lost (4) was divided by the mean density estimates for that species multiplied by 0.33 (Methods Section II.C.). For black bear, the enhancement objective equaled 67,500 acres; for grizzly it equaled 80,000 acres. The average enhancement objective for the 2 species was 73,750 acres.

Potential locations for enhancement include public lands located within the vicinity of Hungry Horse Reservoir; public and private lands within the Northern Continental Divide Ecosystem as defined in the Grizzly Bear Recovery Plan (U.S. Dep. Inter. 1982); or within other grizzly and black bear ranges in Montana. Alternatively, 11,298 acres of prime grizzly bear and black bear habitat could be protected through conservation easements or fee-title acquisitions. These habitat protection projects could take place within the same areas listed above, but would focus on private lands.

4) Recommended Alternative

The recommended alternative for both black bear and grizzly bear mitigation is to protect existing important grizzly bear riparian habitat components and travel corridors. Emphasis has been placed on the grizzly bear because of its threatened status

(Endangered Species Act of 1973), its regional importance, and the current threats to its remaining habitat. Mitigation for grizzly bear would simultaneously mitigate for black bear. Habitat protection measures were selected because grizzly bears often come into conflict with private landowners, particularly in the spring. These human conflicts are considered more of a limiting factor to grizzlies than food or habitat (W. Brewster 1984, pers. commun.) In addition, protection of essential spring habitat and travel corridors on private lands is considered to be a priority project for grizzly bear recovery. (U.S. Dep. Inter. 1982:144).

Protection of these key habitats would occur through acquisition of conservation easements or fee-title acquisitions. The program would emphasize obtaining protection of large undeveloped land tracts rather a few isolated parcels in areas which may receive high density development. Specific habitat components sought for protection would include floodplains, creek bottoms and wetlands, as well as those areas used by grizzly bears when traveling between various foraging areas and/or between subpopulations. The following areas (listed in Table 5) have been selected for the implementation of the conservation easement/fee-title acquisition program. These areas were identified using information obtained from MDFWP, Glacier National Park, and Flathead National Forest Service personnel; aerial photographic interpretation; research publications; and contacts with landowners. Additional areas may be identified through interagency coordination.

A conservation easement - fee-title program would require 4 steps: 1) specific lands would be first identified to determine if the property meets certain criteria (see below); 2) landowners would be contacted to determine if they are willing to negotiate an agreement; 3) an agreement for an easement or fee-title acquisition would be negotiated and finalized; and 4) the agreement would be legally executed.

Criteria will be used to evaluate and select specific sites for conservation easement or fee-title acquisition during implementation of the mitigation project. These criteria include:

1) Quantity and quality of riparian foraging habitat types (i.e. sub-irrigated grasslands, deciduous shrub riparian, deciduous tree riparian, etc.);

2) Frequency of encounters with private landowners;

3) Proximity to known grizzly bear movement corridors and/or concentration areas;

4) Relationship to the U.S. Forest Service Wild and Scenic River acquisition program;

5) Susceptibility to subdivision or commercial development; and

Table 5. Potential locations for acquisition of grizzly bear conservation easements or fee-title purchases in Flathead River System or Flathead Valley.

Specific Area	Reservoir (miles)	Township	Range	Section(s)	Habitat Components/Types: Wetland	Riparian	Upland/Other	Mitigation Purpose/Objective
Nyack Flats (Middle Fork)	9	32N 31N 31N	18W 18W 17W	36 1	River/stream	Gravel Bar Subirrtigated grasslands Deciduous shrub riparian	Agricultural (hay meadows)	- Protection of key Grizzly/black bear spring habitat and grizzly bear travel corridor.
West Glacier to Hungry Horse (Middle and North Fork)	4-11	32N 31N 31N 30N	19W 19W 20W 19@	34-35 2-4,7-12,14-15 17-22,26-30 31-34 1-2,12	River/stream Pond/lake Marsh/slough	Gravel bar Subirrigated grassland Deciduous shrub riparian Deciduous tree riparian	Dense seral lodgepole Old growth conifer Agricultural (hay meadows)	- Protection of key grizzly/black bear spring habitats along floodplain and benchlands; - Protection of grizzly travel corridors
Canada Border to Coal Banks (Upper North Fork)	20-50	34N 35N 36N 36N 37N	20W 21W 21W 21W 22W 22W	17-20,29-30 1,11,13,24 6-8,16-18 20-22,27-29 34-35 30-31 1-4,10-11,13 24-25,33 35-36 5,8-9,16,21-22, 25-29,33-36	River/stream Pond/lake Marsh/slough	Gravel bar Subirrigated grassland Deciduous shrub riparian Deciduous tree riparian Mixed Deciduous/ coniferous	Terrace grassland Upland shrub Dense seral lodgepole Other Conifer Cutting units Pasture	- Protection of key grizzly/black bear habitats along floodplain/ benchlands - Protection of grizzly bear travel corridor
Swan Front (Flathead Valley)	8-10	30N 29N	20W 20W	14-15,22-23 27,34 3,10-11 14-15,22-23 25,36	Marsh/slough Pond/lake River/stream	Subirrigated grassland Riparian shrub Deciduous Tree Mixed deciduous/ conifer	Dense seral lodgepole Other conifer Old growth conifer Cutting units Pasture Agricultural land	- Protection of key grizzly/black bear spring habitat
Swan Front (Swan Valley)		28N 27N 26N 26N	19W 19W 19W 18W	6,7,26-28 33-35 1-2,10-15 23-26 35-36 1,12 6-8 17-21	Marsh Pond/lake	Subirrigated Deciduous shrub riparian Deciduous tree riparian Mixed deciduous/ conifer forest	Upland shrub Coniferous Forest	- Protection of key grizzly/black bear spring habitat

6) Comments received during consultations and coordination with agencies and private landowners.

The recommended mitigation program would be implemented in cooperation with the U.S. Forest Service which is presently administering the Wild and Scenic River program along both the North and Middle Forks of the Flathead River and the U.S. Fish and Wildlife Service, the agency responsible for administering the Endangered Species Act of 1973.

5) Mitigation Accounting

Credits for the habitat protection program would be counted by summing the number of acres of riparian habitat or travel corridor protected by specific projects. This quantity would then be subtracted from the goal of 11,298 acres. Where a habitat enhancement project for another species, such as elk, benefits bears this treated area will be subtracted from the enhancement goal (73,750 acres) for bears. The number of bears requiring mitigation would be proportionately reduced using the formula described in Methods Section II.C. For other target species mitigation projects which result in protection of grizzly bear habitat (such as waterfowl), the 11,298 acre target would be reduced by the appropriate acreage.

Due to the unpredictable nature of land-related negotiations and transactions, specific areas in Table 5 could not be assigned credits. Accounting will have to take place as the project is implemented.

6) Other Target Species Benefitted

The recommended mitigation plan for black bears and grizzly bears has the potential to meet a significant proportion of the mitigation goals for many other target and non-target species. Specifically, partial mitigation could be achieved for elk, mule deer, mountain lion, aquatic furbearers, terrestrial furbearers, mountain grouse, waterfowl, bald eagle, osprey, and many non-target species through the protection of habitats critical to these species (i.e. sub-irrigated grasslands, spruce bottoms, river banks, wetlands, etc.).

C. MOUNTAIN LION

1) Introduction

The impact of the Hungry Horse project on mountain lion was estimated to be low. The quantitative impacts were equivalent to the ungulate loss estimates as shown in Table 3.

2) Mitigation Objectives

- Quantitative:

  • Increase winter range carrying capacity by 175 elk,

  -or-

  • Protect 8,749 acres of elk/mule deer winter range.

  -and-

  • Protect or create 645 acres of mule deer spring range.

3. Mitigation Alternatives

The alternatives for mountain lion mitigation are the same as those for elk and mule deer: 1) increase the carrying capacity through long-term habitat enhancement program on 26,119 acres, or protect 8,749 acres of prime elk and mule deer winter range; and 2) Protect or create 645 acres of mule deer spring range.

4. Recommended Alternative

The recommended alternative is to enhance winter range for elk and mule deer through a long-term management program described for elk/mule deer mitigation.

5. Mitigation Accounting

Accounting would take place as described for the elk/mule deer recommended project alternative.

6. Other Target Species Benefitted

The target species benefitted would be the same as those described for elk/mule deer recommended alternative.

D. AQUATIC FURBEARERS

1) Introduction

Four aquatic furbearer species were moderately to highly impacted by the Hungry Horse hydroelectric project. Conservative quantitative loss estimates indicated a minimum of 125 beaver, 20-43 river otter and an unknown number of muskrat and mink (Table 3). Beaver loss estimates were based on an actual survey made in 1939 which indicated beaver were far below carrying capacity (Atwater 1939). By applying Atwater's carrying capacity estimates for the South Fork River and tributaries, Casey et al. (1984:37) calculated a potential carrying capacity loss of 565 beaver due to Hungry Horse Reservoir. The Hungry Horse project inundated a minimum of 2863 acres of critical aquatic furbearer habitat. The aquatic habitats represented 38.4 miles of river channel and a minimum of 34.3 miles of tributary streams.

2) Mitigation Objectives

- Quantitative:

Aquatic Furbearers:

- Increase carrying capacity for beaver by 125 and river otter by 20-43 through enhancement/management efforts;

-or-

- Protect 2863 acres of riverine and riparian habitats capable of supporting all 4 aquatic furbearers;

-or-

- Protect 38.4 river and 34.3 tributary miles of riparian habitat capable of supporting all 4 aquatic furbearers.

3) Mitigation Alternatives

Mitigation opportunities for aquatic furbearers include habitat enhancement projects along Hungry Horse Reservoir, habitat management and enhancement projects elsewhere in northwest Montana and habitat protection programs.

To determine if enhancement potential exists along Hungry Horse Reservoir, information is needed to determine the extent aquatic furbearers utilize the reservoir and associated tributaries. At present, such knowledge is lacking. Similarly, to develop aquatic furbearer management plans and guidelines or enhancement possibilities on river systems in northwest Montana, sufficient information on habitat requirements, food habits, population characteristics and distribution would be needed.

As an alternative to habitat enhancement and management opportunities, mitigation could be accomplished through habitat protection strategies (conservation easement/fee-title acquisition). The goal would be to protect 38.4 river miles and 34.3 stream miles which translates into a minimum of 2863 acres of aquatic and riparian habitat important to acquatic furbearers. A significant portion of this mitigation alternative could be accomplished through the recommended Black Bear/Grizzly Bear project and the recommended Waterfowl project (Section G).

4) Recommended Alternative

Because benefits can be received from the Black Bear/Grizzly Bear and Waterfowl projects, the recommended mitigation project would be to investigate and develop habitat management enhancement and, if appropriate, protection opportunities for the river otter in northwestern Montana. The proposed project would primarily focus on river otter, although mink, muskrat and beaver would receive secondary attention. Mitigation for river otter is preferred for several reasons: 1) river otter habitat requirements are narrow and more restrictive than mink, beaver or muskrat; 2) it is a species dependent on running river systems and sensitive to habitat alterations; 3) it is a good indicator of quality habitat for other species; and 4) it is a species of special concern to the state because of its listing by the Commission on International Trade in Endangered Species Act (C.I.T.E.S. Act); and 5) little is known about river otter (and other aquatic furbearer) populations and habitat requirements in northwestern Montana. In addition, it is likely mink, muskrat and beaver will be benefitted through waterfowl projects while river otter may not.

The recommended project would have 3 major objectives: 1) to assess the current status, distribution and habitat requirements of river otter in northwest Montana; 2) to identify current river otter (and other aquatic furbearer) habitat enhancement and protection needs and re-introduction opportunities on existing reservoirs and downstream habitats; and 3) to identify how impacts from future hydrological or other riparian developments on otter and aquatic furbearers can be mitigated.

It is anticipated that by increasing our understanding of the specific population dynamics and habitat requirements of the river otter (and other aquatic furbearers), better protection and management of these resources can take place in northwestern Montana. Improved furbearer population/habitat management and protection, in combination with other recommended mitigation projects, would mitigate the 20-43 river otter and 125 beaver impacted by the reservoir.

5) Mitigation Accounting

No quantitative accounting procedure will be used for aquatic furbearer mitigation. The recommended project assumes benefits to aquatic furbearers will accrue from the recommended Black Bear/Grizzly Bear and the Waterfowl projects.

6) Other Species Benefited

The recommended mitigation project for aquatic furbearers would primarily benefit aquatic furbearers. Where actual habitat-related enhancement or protection strategies are implemented, waterfowl, bald eagle and osprey could be benefitted.

E. TERRESTRIAL FURBEARERS

1) Introduction

Terrestrial furbearers impacted by the Hungry Horse hydroelectric project included the bobcat, pine marten and lynx which suffered low, low to moderate and moderate impacts, respectively. Although the numbers of terrestrial furbearers lost could not be determined, pine marten lost a minimum of 14,542 acres of preferred forested habitats. The lynx lost at least 229 acres of dense seral lodgepole stands, an important cover type for its key prey species, the snowshoe hare (Lepus americanus). The impact on bobcat was the low-level loss of general suitable habitat.

2) Mitigation Goals

- Quantitative:

  • To protect or manage 14,542 acres of coniferous mixed forest for pine marten and 229 acres of seral lodgepole for lynx.

3) Mitigation Alternatives

The major mitigation alternative for terrestrial furbearers would emphasize pine marten and, to a lesser degree, lynx. The pine marten's dependence on mature and/or old growth conifer forests makes long-term habitat protection and management the only feasible approach. Methods to achieve sufficient habitat protection include habitat acquisition (through conservation easement or fee-title purchase); development of long-range mature/old growth timber management plans on U.S. Forest Service lands adjacent to Hungry Horse Reservoir; or adoption of long-term mature/old growth management plans on public or private lands within northwest Montana.

For lynx, the mitigation alternatives include long-term maintenance and enhancement of doghair lodgepole pine stands on lands adjacent to the reservoir or the permanent protection of this habitat type through conservation easements or fee-title acquisitions. In order to maximize the benefits to the lynx, a territorial species, the several seral lodgepole pine stands should be scattered over a large area.

Other recommended mitigation projects may partially mitigate terrestrial furbearer losses. For example, various elk/mule deer winter range enhancement plans may include long-term maintenance of mature or old growth timber for cover. In addition, habitat protection obtained through conservation easements or fee-title

purchases for black bear/grizzly bear mitigation might contain sufficient mature forest or old growth stands to support marten. Lands protected by easements or purchased could also contain doghair lodgepole stands, important for maintaining a lynx population.

4) Recommended Mitigation Project

The recommended project is to develop long-term protection and management plans for old-growth forests in northwest Montana. Because the U.S. Forest Service has placed heavy emphasis on timber production near Hungry Horse Reservoir, it would not be feasible to propose blanket protection on 14,542 acres of old-growth and mature forests. In addition, much of the commercial forest near the reservoir either has been cut over or burned within the last 60-70 years. Finally, the issue of mature and old-growth forest management for wildlife species, partially or wholly dependent on its existence, extends across all forests in Montana. Therefore, the recommended project is to promote, develop and implement old growth forest management plans on private, state and federal forested lands in northwest Montana. This would be accomplished through coordination and consultation with private, state and federal land managers. Compensation for deferred timber sales may be a necessary part of the long-term plans.

At a minimum, the goal would be to develop a long-term, old-growth management plan on 14,542 acres of forested lands managed by private, state and/or federal entities. Protected forests would include a variety of habitat types, including floodplains, and incorporate tracts large enough to support marten and other selected old-growth indicator species.

Optimal old-growth management should occur on large planning units with a minimal size of 1,000 acres (McClelland 1979). Within the planning unit, 50 to 100 acre or larger tracts would be delineated and protected as old-growth dependent species such as pine marten (Hawley and Newby 1957) and pileated woodpecker (Dryocopus pileatus) (McClelland 1979, McClelland et al. 1979). Small openings of various sizes and shapes and seral stages (i.e. clear cuts) could be interspersed throughout the unit.

A potential location for development and implementation of the plans would be in the Swan River drainage. The Swan contains mixed ownership as well as a significant amount of riparian and conifer old-growth which is rapidly diminishing. It is hoped implementation of an old-growth management plan in one or several locations would assist land managers to pursue similar plans elsewhere.

In addition to old-growth management for marten, the recommended terrestrial furbearer mitigation package should include long-term management for dense lodgepole pine stands on a minimum of 687 (229 x 3) acres for lynx. This management could take place along the east side of Hungry Horse Reservoir where dense lodgepole

stands are abundant in conjunction with the recommended elk/mule deer project on Firefighter Mountain. Present timber management plans for much of the area call for thinning of these stands. Lynx management areas should be scattered to optimize the benefits to this territorial animal, but be large enough tracts to provide quality habitat for an abundance of snowshoe hares.

5) Mitigation Accounting

Each acre of mature old-growth forest included within a long-term old-growth management plan would be subtracted from the goal of 14,542 acres. Similarly, large tracts of contiguous old-growth or mature forest protected via a conservation easement or fee-title acquisition project would also be subtracted from the 14,542 acre goal. It may be possible to include old growth management areas within elk winter range enhancement/protection mitigation projects. When this occurs, the acreage would also be subtracted from the 14,542 acre target.

6) Other Target Species Benefitted

The implementation of the recommended project has the potential to benefit white-tailed deer, mountain lion, black bear. It also would benefit important and/or rare old-growth depended species such as the barred owl, pileated woodpecker, and goshawk (Accipter gentilis).

F. MOUNTAIN GROUSE

1) Introduction

Construction of the Hungry Horse project resulted in high impacts to ruffed grouse populations and moderate impacts to blue and spruce grouse populations. Insufficient data were available to derive quantitative loss estimates. The high impacts to ruffed grouse were attributed to inundation of a minimum of 5430 acres of prime year-round habitat (3619 acres of mixed deciduous/coniferous forest, 1077 acres of deciduous shrub riparian, 100 acres of deciduous tree riparian, and 634 acres of terrace and other grasslands) necessary for this species. The moderate impacts to blue grouse were based on loss of important lower slope and benchland breeding habitats (open coniferous forests). Spruce grouse were impacted by the inundation of 10,923 acres of coniferous habitats utilized by this species.

2) Mitigation Objectives

- Quantitative:

  - Enhancement of 5430 acres of optimal ruffed grouse habitat (deciduous riparian or other deciduous vegetation types).

3) Mitigation Alternatives

Alternatives for mountain grouse include increasing existing carrying capacities through habitat manipulations for each species or the long-term protection and management of existing productive habitats. Enhancement opportunities for all 3 grouse species do exist along the reservoir, upper South Fork River, and the Spotted Bear River. Habitat protection projects could also be applied along other portions of the Flathead River system or in northwest Montana.

4) Recommended Alternative

The recommended mitigation project for mountain grouse is to enhance habitat primarily for ruffed grouse through vegetation manipulation on lands adjacent to the reservoir. This project would be more cost effective than habitat protection or acquisition alternatives. Habitat manipulations for ruffed grouse would also benefit blue grouse. The ruffed grouse project was selected because impacts were greatest to this species and because it would simultaneously benefit blue grouse. In addition, spruce grouse habitat (coniferous forest) is not considered limiting in northwestern Montana.

Specifically, the proposed project would target 5430 acres of habitat for ruffed/blue grouse management. Habitat manipulations

would take place on lower slopes, benches and creek bottoms which are conducive to creation and long-term management of aspen (Populus tremuloides) and birch (Betula spp.) stands. Hardwood stands provide important year-round habitat for ruffed-grouse and important breeding and brood-rearing habitat for blue grouse.

The proposed grouse enhancement project would require long-term cooperative agreements between the land managing and wildlife agencies for the selected treatment areas. The management agreements would extend for the life of the Hungry Horse hydroelectric project and would include detailed enhancement plans, retreatment schedules and monitoring requirements.

Other recommended mitigation projects such as the creation of aspen or birch habitats for elk/mule deer, may benefit ruffed or blue grouse as well. Protection of hardwood stands, sub-irrigated grasslands, and deciduous riparian shrub communities along rivers or creek bottoms through conservation easements or fee-title acquisitions would also benefit ruffed and blue grouse.

5) Mitigation Accounting

Each acre considered part of a long-term grouse habitat treatment program will be subtracted from the mitigation goal of 5430 acres. In addition, ruffed grouse habitat protected through conservation easement or fee-title acquisitions will be subtracted from the same overall acreage target. Aspen or birch stands created (or protected) through elk/mule deer winter range enhancement programs will also be applied on an acre for acre basis to the mitigation objective (5430 acres). It is estimated that at least 67% of the grouse enhancement objective can be met through other projects.

6) Other Target Species Benefitted

Creation or protection of aspen/birch communities will benefit elk, mule deer, white-tailed deer, black bear and grizzly bear, In addition, many non-target wildlife species will also be benefitted.

To offset waterfowl losses due to the Hungry Horse project, the preferred alternative would be to protect or enhance existing productive waterfowl habitats elsewhere Montana according to mitigation guidelines (Appendix A).

4) Recommended Alternative

The preferred alternative for waterfowl mitigation is to protect and/or enhance 1,508 acres of prime waterfowl habitat within the Flathead Valley and vicinity.

This targeted acreage was calculated by weighing and summing the acreages of waterfowl habitat inundated by the reservoir (Table 6). Prime habitats such as islands, pond/lake,marsh/slough and deciduous tree riparian were given a weight of 10. Deciduous shrub riparian and old-growth coniferous forest were given a weight of 5, while gravel bar was given a weight of 2. Acreages of each habitat were multiplied by the weight factor and summed to obtain total weighted acreage. The total weighted acreage was then divided by 10 to equal the acreage of prime waterfowl habitat requiring protection or enhancement within the Flathead Valley.

The Flathead Valley contains numerous wetlands, sloughs, rivers, creeks, lakes and potholes highly conducive to waterfowl production. Flathead Valley is currently undergoing extensive population and subdivision growth particularly near water. Subdivision impacts on wetlands include the removal of upland nesting cover, drainage, recreational disturbances, degraded water quality from septic systems and runoff, and introduction of domestic animals. Waterfowl production can be severely limited due to these impacts and disturbances. Many highly productive wetlands are also being drained for irrigation or for planting crops.

Through the acquisition of conservation easements and/or fee-title, existing or previously existing highly productive wetlands in the Flathead Valley can be protected or enhanced. The primary purpose of any private or public lands acquired (fee-title or conservation easement) or enhanced would be for waterfowl. Secondary considerations may be given to other target species benefitted such as aquatic furbearers or osprey. Protection strategies would include minimizing subdivision development, disallowing drainage or diversion possibilities, and limiting upland cover removal. Enhancement opportunities would include restoring natural drainage patterns, creating islands, increasing open water and/or emergent vegetation edge habitat, restoring upland cover, and minimizing disturbances during the nesting season.

Potential locations for waterfowl habitat protection and enhancement projects within the Flathead Valley have been identified through cooperation and coordination with the U.S. Fish and Wildlife Service (Table 7). These sites will be evaluated and

G. WATERFOWL

1) Introduction

Construction of the Hungry Horse hydroelectric project resulted in low to moderate impacts to several waterfowl species. Due to a lack of population data prior to construction, no quantitative population loss estimates were developed. Mallard losses were considered moderate because this species was the most common species breeding at beaver ponds (Atwater 1939). The wood duck, Barrow's goldeneye and common merganser also suffered moderate impacts due to loss of cavity-nesting habitat. The harlequin duck was given a low-moderate loss estimate because of its preference for swift-water habitats found along the South Fork tributaries. Canada goose and common goldeneye impacts were considered low primarily because of the estimated low populations that probably existed along the South Fork River.

Important waterfowl habitats inundated by the reservoir included 32 islands (comprising 307 acres), 1,005 acres of deciduous shrub, 100 acres of deciduous tree riparian, 176 acres of sub-irrigated grasslands, 147 acres of marshes and sloughes and 54 acres of lakes and ponds. These habitats (1,789 acres total) represented important nesting, as well as brood-rearing habitats for impacted waterfowl species (Table 3).

2) Mitigation Objectives

- Quantitative:

  - To protect prime waterfowl breeding and/or brood rearing habitat equivalent to calculated acreage of prime waterfowl habitats inundated by the Hungry Horse hydroelectric project.

3) Mitigation Alternatives

Enhancement opportunities for waterfowl could be undertaken at Hungry Horse Reservoir; however, these developments are not considered to be cost effective. Approximately 7 to 8 miles of gravel, mud and sand are exposed at the upper end of the reservoir during winter and spring due to reservoir drawdown. This upper region could be enhanced through extensive diking, island building and revegetation work; however, the tremendous fluctuations in the reservoir level makes building such structures a major undertaking. In addition, there is little natural brood habitat remaining in the reservoir area; this would have to be created if nesting habitats were enhanced. Additionally, ice often remains on the reservoir, particularly in the shallow bays, well into the breeding season. Thus, for several reasons, the benefits of enhancement efforts were considered marginal in relation to expense.

Table 6. Calculation of waterfowl acreage objective.

Nesting & Brood-rearing Habitats	Acres	x	Waterfowl Value	=	Total Weighted Acreage
Pond/Lake	54		10		540
Marsh/Slough	144		10		140
Gravel Bar	375		2		750
Subirrigated grassland	176		10		1,760
Deciduous shrub riparian	1,005		5		5,025
Deciduous tree reparian	100		10		1,000
Old growth coniferous forest	560		5		2,800
Islands	307		10		3,070
TOTAL	2,451				15,085/10

Acres of prime waterfowl habitat = 1,508.5

Table 7. Potential locations and approximate acreages of waterfowl mitigation projects in Flathead Valley

Wetland Name/Area	Description	Township	Range	Section(s)	Approximate Acreages
Potholes northwest of Kalispell	Group of potholes	29N	22W	14,15,22	472
Morning Slough	Potholes at base of Swan Range	29N 30N	20W 20W	3 34	120
Wetlands West and Northwest of Kalispell	Small wetland Drained pothole	29N 28N	22W 22W	33 3, 4	35 75
McWenneger Slough	Oxbow Lake	29N 28N 28N	20W 20W 21W	31,32 6 1	420
Fairview Marsh	Large pothole	29N	20W	28,29,32,33	520
Old Steel Bridge	Remnant Marsh	28N	21W	11	125
Eagan Slough	Oxbow Lake	28N	20W	17-20,30	800
Church Slough	Oxbow Lake	28N	20W 21W	31 36	400
Robocker Ponds	Oxbow Ponds	28N	20W	29	120
Hodgeson Pond	Pothole	28N 27N	20W 20W	33 4	185
Patrick Creek Slough	Creek, Marsh, Slough	27N	21W	3,10,11,15	330
Unknown Slough	Remnant Slough	27N	21,20W	1, 6	140
Cooper's Slough	Old Slough	27N	21W	13,14	300
Bethel potholes	Potholes	27N	20W 21W	6, 7,18 12	240 60
Unknown Slough	Old Slough	27N	20W	5, 7, 8,18	360
Cat Bay Wetland (West Side Flathead Lake)	Large Marsh	23N	20W	3,10	200
Sandsmark WPA Additions (Ninepipe National Wildlife Refuge)	Potholes	19N	20W	16	160
Flathead WPA Expansion	Wetlands	27N	20W	19,20,21,28, 30	2,000
Flathead WPA Special Projects	Enhancement	27N	20W	19,20,21,28, 30	100
Batavia WPA Expansion	Wetlands/hay meadows	28N	22W	16,20,21,29	500
Batavia WPA Special Projects	Enhancement	28N	22W	16,20,21,29	200
Smith Lake Expansion	Wetlands/hay meadows	27N	22W	4,8,9,17,18	1,490
Smith Lake Special Projects	Enhancement	27N	22W	4,8,9,17,18	1,000
Swan River Expansion	Wetlands	25N	18W	22,23,26,27 34,35	2,000
Swan River Special Projects	Enhancement	25N	18W	22,23,26,27 34,35	500
TOTAL					12,260

ranked according to existing, as well as potential, waterfowl productivity using established criteria (Appendix B).

Protection and enhancement of wetlands may also include the opportunity to increase the size of wetland areas already managed by the U.S. Fish and Wildlife Service. A key example would be to raise a dike a few feet on the Smith Lake Waterfowl Protection Area (WPA) located 10 miles west of Kalispell to increase the inundated area. Several enhancement projects such as incorporating water flow regulation structures and creating islands and upland nesting cover could be implemented to increase waterfowl productivity. The U.S. Fish and Wildlife Service is currently developing the scope and potential of this alternative.

If development of one of the alternatives exceeded the targeted acreage (1508 acres), project implementation may require combining Hungry Horse waterfowl mitigation credits within the objectives of other hydroelectric projects (e.g. Libby Dam).

5. Mitigation Accounting

Each acre of prime waterfowl habitat protected through a conservation easement or fee-title acquisition would be subtracted from the 1508 acre goal. The same procedure would apply to the federally administered wetlands enlarged or enhanced. For enhancement projects on federal or state administered wetlands, credits would be applied on a 3 to 1 basis using the enhancement objective criteria described in Methods (IIC).

6. Other Target Species Benefitted

Other target species which may be benefitted include aquatic furbearers (beaver, mink, muskrat), osprey, and bald eagle. Upland game birds, and white-tailed deer may also be benefitted depending on location of a conservation easement or fee-title acquisition.

H. BALD EAGLE/OSPREY

1) Introduction

Construction of the Hungry Horse project resulted in both positive and negative impacts to the federally endangered bald eagle and positive impacts to the osprey. An estimated 15 bald eagles traditionally utilized the South Fork for wintering due to the availability of open water and carrion. Because the reservoir freezes each winter eliminating foraging opportunities, impacts to wintering bald eagles were considered moderate to high (negative).

Little information was available to determine abundance of breeding bald eagles and osprey along the South Fork prior to construction of the reservoir. Because the reservoir currently offers suitable nesting habitat for at least 1 bald eagle pair and 8 osprey pairs (MDFWP unpublished files) impacts were considered negligible to nesting bald eagles and moderately positive to nesting osprey.

The effects of the Hungry Horse project on migrating bald eagles is somewhat complex. Following the introduction of kokanee salmon (Oncorhynchus nerka) into Flathead Lake in the early 1900's, spawning runs began up the mainstem of the Flathead River, the Middle Fork of the Flathead River and tributaries. Limited spawning apparently took place within the South Fork prior to construction of Hungry Horse Dam because of unsuitable substrate. By the late 1930's spawning salmon began to attract significant numbers of bald eagles to the region during the fall. Relatively low numbers (a maximum average of 22) were noted in Glacier National Park between 1939 and 1948; however, numbers significantly increased following that time.

The fall increase in bald eagles may be attributable to construction and operation of Hungry Horse Dam which enhanced the spawning habitat for salmon in the mainstem of the Flathead River due to warmer water releases from the reservoir. Because of this potential benefit and the fact bald eagles currently utilize the remaining portions of the South Fork and Hungry Horse Reservoir, it was estimated the Hungry Horse project resulted in low to moderate positive impacts on migrating bald eagle populations. However, this low to moderate positive effect was significantly offset during the 1970's when flows from Hungry Horse Dam changed and caused a significant decline in spawning salmon in the Flathead mainstem (Fraley and Graham 1982). Assuming flows from Hungry Horse Dam continue to be regulated in the fall (and the mainstem salmon population increase, the historical benefits of salmon populations in the mainstem can be recouped. However, if regulated flows do not successfully result in recovered mainstem spawning salmon populations, the operational benefits of Hungry Horse Dam cannot be used to offset construction impact losses (i.e. the loss of wintering habitat).

2) Mitigation Objectives

Season	Quantitative/Qualitative
Bald Eagle	
Winter	Increase the carrying capacity of winter foraging habitat for 15 eagles
Breeding	Maintain or increase current level of breeding habitat
Migration	Assure recovered mainstem salmon spawning populations and protect bald eagle foraging and roosting habitats along Flathead River System.
Osprey	
Breeding	Maintain suitable breeding habitat

3) Mitigation Alternatives

Bald Eagles:

Due to the freezing over of Hungry Horse Reservoir, little opportunity exists for enhancement of bald eagle wintering habitat adjacent to the reservoir. Therefore, this alternative was eliminated from the potential mitigation opportunities explored.

In lieu of enhancing wintering habitat, opportunities exist for the improved management and protection of habitats used by migrating (as well as wintering) bald eagle populations. Because flows at Hungry Horse Dam are currently being regulated to benefit kokanee salmon spawning in the Flathead mainstem (Northwest Power Planning Council 1982), the number of bald eagles feeding on mainstem salmon is expected to increase. Providing that these flow restrictions continue, and spawning salmon populations do recover, the historical benefits of Hungry Horse operation on migrating bald eagles could be recouped. However, these benefits are dependent not only on the increased availability of spawning kokanee salmon but also on the availability of secure foraging and roosting areas along the Flathead River system. The second alternative, therefore, would stress the need for the recovery of spawning kokanee salmon populations in the Flathead River mainstem and provide for the long-term protection and management of foraging and roosting areas.

Other alternatives for bald eagle mitigation would include the protection or enhancement of existing or historic nesting sites and habitat. Known active or historic nesting sites

are located along the North Fork drainage, Hungry Horse Reservoir, Flathead River (mainstem), Flathead Lake and several of the large lakes. Currently, these nest sites are being threatened by subdivision, logging and commercial developments.

Osprey:

Because osprey do not winter in Montana and migrate prior to salmon spawning, the best opportunity for mitigation is to protect or enhance currently occupied osprey nesting habitat. This could take place along the Hungry Horse Reservoir or the Flathead River system.

4) Recommended Alternative

To mitigate the loss of bald eagle wintering habitat and to assure potential benefits to eagles of the kokanee salmon fishery in the Flathead River system, the preferred alternative is to develop appropriate protection and management strategies for bald eagles migrating, wintering, or breeding in the Flathead River system. This project would complement existing bald eagle research and management efforts presently being undertaken by various agencies. It would also be consistent with bald eagle management objectives and recommendations of the Montana Bald Eagle Working Group, an interagency task force, the U.S. Fish and Wildlife Service, the Bald Eagle Recovery Team and the Montana Department of Fish, Wildlife and Parks. This recommended alternative includes bald eagle breeding habitat because protection of these areas is important to recovery of bald eagles.

This recommended alternative would have 3 specific objectives: 1) to identify, protect and manage foraging and roosting habitats for migrating and wintering bald eagles utilizing food resources of the Flathead River system (north of Flathead Lake); 2) to monitor bald eagle population dynamics and habitat utilization in response to operations of Hungry Horse Dam; (and kokanee recovery); and 3) to identify, protect and manage existing as well as potential nesting habitats located within the Flathead River System.

Implementation of this project would be coordinated with ongoing U.S. Fish and Wildlife Service, National Park Service, U.S. Forest Service, and Montana Department of Fish, Wildlife and Parks bald eagle management and research efforts. Critical gaps exist in ongoing data collection and management efforts (e.g. the lack of bald eagle data gathered outside Glacier National Park during the fall and winter). Once data gaps are closed, specific management projects, such as the development of cooperative agreements, the acquisition of conservation easements, and road closures could be implemented.

Osprey:

No particular projects are recommended for osprey mitigation; it is anticipated that osprey nesting habitat will be protected through implementation of the recommended bald eagle nesting habitat project.

5) Mitigation Accounting

No mitigation accounting procedures have been proposed. Development of the bald eagle project assumed benefits could accrue from the Black Bear/Grizzly Bear and waterfowl projects. Thus, the recommended project was designed to complete habitat. It was also assumed implementation of the bald eagle project could sufficiently protect osprey nesting habitats.

6) Other Target Species Benefitted

Target species benefitted could include aquatic furbearers, waterfowl, and osprey.

I. MITIGATION PLAN

1. Ranking of Proposed Projects for Implementation

To set guidelines for project prioritization and initiation, projects were ranked using the following criteria: 1) the number of target species (groups) potentially benefitted by a project (Appendix C); 2) the qualitative impact level (from Table 3) assigned to those species (groups) which would be benefitted from the project (i.e. low=1, moderate=2 or high=3); and 3) the threatened or endangered status of the species benefitted by a project.

For each project, points were assigned on the basis of these criteria. One point was given for each species (group) potentially benefitted by a project. For the second criteria the number of points equal to the sum of values between 1 and 3 representing qualitative loss estimates per species (group) was allocated to each project. Finally, 2 or 3 points were awarded for each threatened or endangered species, respectively, benefitted by a project. The results of this ranking procedure are presented in Table 8.

The ranking provided a guideline for project implementation based on potential project benefits. Based on interagency consultations and ongoing agency projects, the following implementation order (Table 9) is recommended with associated initiation time-frames.

The Ruffed Grouse project was placed lower on the list because a significant portion of the grouse objectives should be obtained through the Black Bear/Grizzly Bear Project. The Bald Eagle project was placed as a high second priority because of its endangered status and the current need to look at bald eagles in response to the regulated flows from Hungry Horse Dam.

2. Final Mitigation Objectives

To mitigate wildlife losses due to Hungry Horse Reservoir, several projects and alternatives have been proposed. Among these projects, many of them such as the Elk/Mule Deer and Black Bear/Grizzly Bear projects have a significant degree of overlap. That is, when implemented, these projects would both benefit some of the same species. Because the mitigation accounting procedures described in this document were designed to apply to projects as they are actually implemented, the exact contribution of each project to the mitigation goals for other species is not known. However, to develop cost estimates, it was necessary to estimate the degree of overlap between the recommended projects and to adjust the mitigation objectives accordingly.

Table 8. Points assigned to each recommended wildlife mitigation project for purpose of ranking projects (Hungry Horse hydroelectric project, Montana).

Ranking Categories	Elk/Mule Deer	Black Bear Grizzly Bear	Aquatic Furbearers	Terrestrial Furbearers	Mountain Grouse	Waterfowl	Bald Eagle/ Osprey
Number of species (groups) benefitted [1]	8	11	3	4	5	3	3
Sum of qualitative values for species (groups) benefitted [2]	16.8	22.0	5.2	7.5	9.3	5.2	5.2
Threatened Species (=2) or Endangered Species (=3) benefitted	2	2	—	—	—	—	—
	—	3	—	—	—	3	3
Total	26.8	38.0	8.2	11.5	14.3	11.2	11.2
Rank	1	1	3	2	2	2	2

[1] Appendix C

[2] Values of 3=High; 2=Moderate; 1=Low were taken from Table 3. Averages of these numbers were used for species groups.

Table 9. Recommended project priorities and implementation schedules for mitigation projects, Hungry Horse.

Priority	Project	Time-Frame (years)
1.1	Black Bear/Grizzly Bear	0-3
1.2	Elk/Mule Deer	0-3
2.1	Bald Eagle	0-5
2.2	Waterfowl	0-5
2.3	Terrestrial Furbearers	0-5
3.1	Aquatic Furbearers	0-10
3.2	Ruffed Grouse	0-10

a) Elk/Mule Deer - Black Bear/Grizzly Bear Project

It was anticipated that the elk/mule deer winter range enhancement projects would enhance black bear and grizzly bear habitat, particularly where berry-producing shrubfields were created. Similarly, it was expected that the Black Bear/Grizzly Bear project would result in protecting elk winter range (particularly in the North Fork of the Flathead River) and elk/mule deer spring range. To assess the benefits of the elk projects to bears, it was estimated that for each acre treated for elk/mule deer, bears would receive 0.80 acres enhancement credit. If 70% of the elk project were implemented, 18,283 acres (0.70 x 26,119 acres) of winter range habitat would be enhanced or managed for elk and mule deer. When credited against the bear enhancement objective (73,750 acres), the 18,283 acres of winter-range enhancement projects represent approximately 20% of the black bear/grizzly bear mitigation objective (18,283 acres x 0.80)/73,750 acres = 0.20).

To estimate the benefits of the black bear/grizzly bear projects for elk/mule deer, it was assumed that each acre of winter range protected by a conservation easement or fee-title acquisition, would mitigate 1 acre of total winter range lost due to Hungry Horse Reservoir. (The number of acres would be subtracted from the 8,749 acres of winter range inundated by Hungry Horse Reservoir). Because it is unknown exactly where a conservation easement or fee-title acquisition will take place, it was assumed that approximately 30% of the acquired lands would contain elk or mule deer habitat.

Assuming 70% of the elk/mule deer winter range objective is reached (18,283 acres), 20% of the black bear/grizzly bear objective also would be achieved (Table 10). To complete bear mitigation, 80% of the black bear/grizzly bear mitigation project must be implemented. This would be equal to acquiring conservation easements or fee-title on 9,038 acres (0.80 x 11,298 acres). Acquisition of 9,038 acres of bear habitat should mitigate for the remaining 30% of the elk/mule deer project (0.30 x 9,038 ac = 2711 acres) (Table 10).

b) Bald Eagle/Osprey, Waterfowl, Aquatic Furbearers

The implementation of the Elk/Mule Deer project should not result in benefits to waterfowl, aquatic furbearers, bald eagles or osprey. However, black bear/grizzly bear conservation easements or fee-title acquisitions along certain riparian habitats (i.e. backwater sloughs, salmon spawning streams) could benefit all 3 of these species groups. In addition, the recommended Waterfowl project could benefit aquatic furbearers, bald eagles and osprey.

Design of the recommended Bald Eagle/Osprey and Aquatic Furbearer projects already assumed the anticipated benefits of the

Table 10. Contribution of Elk/Mule Deer and Black Bear/Grizzly Bear projects to mitigation goals for these 2 species groups.

Project	Mitigation Objective	Final Project Objective	Project Benefits			
			Elk		Bear	
			ac	%	ac	%
Elk/Mule Deer	26,119 ac enhanced	18,283 ac enhanced	18,283	70	14,626	20
Black/Grizzly Bear	11,298 ac acquired	9,038 ac acquired	2,711	30	9,038	80
Total				100		100

Waterfowl and Black Bear/Grizzly Bear projects. Therefore, the mitigation objectives for these 2 projects should remain as recommended.

For the Waterfowl project, however, prime waterfowl areas (or the equivalent) could be protected by black bear/grizzly bear or bald eagle conservation easements or fee-title acquisition. Acreages of waterfowl habitat protected should be subtracted from the waterfowl objective (1,508 acres) after acquisition. The maximum degree of overlap between the Waterfowl project and the Bald Eagle and Black Bear/Grizzly Bear projects was estimated represent 5% of the black bear/grizzly bear mitigation objective or 452 acres (0.05 x 9038 acres)(Table 11). Therefore, the adjusted waterfowl goal for mitigation (1,508 acres) should be reduced by 452 acres (or 30%) to 1,056 acres (Table 11) assuming bear acquisitions result in protection of prime waterfowl habitat.

c) **Terrestrial Furbearers and Ruffed Grouse**

Portions of the mitigation objectives for terrestrial furbearers and ruffed grouse will probably be obtained through either the recommended Black Bear/Grizzly Bear project or the Elk/Mule Deer project. For example, where old-growth or mature forests are protected by a black bear/grizzly bear conservation agreement, mitigation for marten would be achieved. Similarly, riparian meadows and deciduous forests protected through a conservation easement would benefit ruffed grouse. The Elk/Mule Deer project may result in the creation of aspen/birch stands also favored by ruffed grouse.

It has been estimated that at least 20% of the Black Bear/Grizzly Bear project (9,038 acres x 0.20 = 1,808 acres) and 10% of the Elk/Mule Deer project (0.10 x 18,283 = 1,828 acres) would benefit ruffed grouse. These combined benefits would reduce the mitigation goal for ruffed grouse (enhancement of 5,430 acres) by 3,636 acres, or 67%, to leave 1,794 acres remaining in the ruffed grouse project (33%) (Table 12).

For terrestrial furbearers, it has been estimated that at least 10% of the lands acquired by the recommended Black Bear/Grizzly Bear project (9,038 acres) would contain old growth or mature forest suitable for terrestrial furbearer mitigation. Therefore, the mitigation objective for old-growth management (14,542 acres) could be reduced by 904 acres (0.10 x 9,038) to equal 13,638 acres, (Table 12). It has been assumed that lynx mitigation (687 acres of dog-hair lodgepole) would occur through the recommended Elk/Mule Deer project.

Table 11. Contribution of the Black Bear/Grizzly Bear, Waterfowl and Aquatic Furbearer projects to Bald Eagle, Aquatic Furbearer and Waterfowl mitigation.

Project	Mitigation Objective	Final Project Objective	Project Benefits		
			Bald Eagle Osprey %	Aquatic Furbearers %	Waterfowl %
Black Bear/ Grizzly Bear	11,298 ac acquired	9,038 acres acquired	n/a*1	n/a	30
Bald Eagle/ Osprey	----	Management and Protection Bald Eagle habitats	100%	n/a	n/a
Waterfowl	1,508 ac acquired	Acquire 1,056 acres	n/a	n/a	70
Aquatic Furbearer (River Otter)	----	Management, enhancement of river otter habitat in N.W. Montana	n/a	100%	n/a
Total			100%	100%	100%

*1 n/a Not applicable; overlap has already been considered for this species (group) in project design.

Table 12. Contribution of the Black Bear/Grizzly Bear, Elk/Mule Deer, Terrestrial Furbearer and Ruffed Grouse Projects to Terrestrial Furbearer and Ruffed Grouse mitigation goals.

Project Implemented	Mitigation Objective	Final Project Objective	Project Benefits: Terrestrial Furbearers Acres	Terrestrial Furbearers %	Ruffed Grouse Acres	Ruffed Grouse %
Black Bear/ Grizzly Bear	11,298 ac acquired	9,038 ac acquired	904	6	1,808	33
Elk/Mule Deer	26,119 ac enhanced	18,283 ac enhanced	---	---	1,828	34
Terrestrial Furbearers	14,542 ac Managed	13,638 ac Managed	13,638	94	---	---
Ruffed Grouse	Enhance	Enhance	---	---	1,794	33
Total	---	---	14,542	100%	5,430	100

3. Estimated Costs

Costs of individual projects, using final mitigation objectives, have been estimated for all 7 recommended projects. These costs have been delineated using 2 formats. In Table 13, project costs are presented by 4 phases or categories: advance design, implementation, maintenance, and monitoring. The advance design stage entails project design, plan development, and interagency coordination. Implementation refers to the initial on-the-ground habitat treatments, acquisitions, or research/management projects. Maintenance applies to those projects requiring repeated habitat treatments (following the initial ones) over the life of the project. Finally, monitoring encompasses the periodic measurements or assessments of project success made after implementation and/or maintenance procedures are completed. Justifications for project costs are given in Appendix D.

Estimated costs, on an annual basis, for each project are illustrated in Table 14. These estimates are based on recommended staggered implementation schedules and include the appropriate costs for that year. Costs are specifically given for 100 years (assumed project life). The first 10 to 12 years represents implementation of all projects. An annual cost per project covering all maintenance and monitoring requirements for years 12 to 25 and 26-100 is also presented in Table 14.

The specific cost estimates made for each recommended project should be considered guidelines for decision-makers using this document. They do not reflect the extensive or detailed planning required for proposal submittal. Rather, these cost estimates reflect anticipated cost ranges for projects and perhaps upper cost limits in many cases. Final project objectives, target acreages and associated costs will be developed and modified during the design and implementation phases.

4. Comparison of Estimated Project Costs to Alternatives

The recommended mitigation projects were selected by using the criteria described in the Methods Section. These criteria emphasized selecting enhancement projects in preference to fee-title acquisition projects. One principal reason for this preference was the high cost associated with land acquisition. As shown in Table 15, the estimated costs of fee-title acquisition for each mitigation project are significantly greater than the estimated costs for recommended projects described in this report. To mitigate wildlife impacts through habitat acquisition, the expected costs could be 2 to 3 times the costs using other alternatives.

Table 13. Estimated costs (1984 dollars), by total and by category, for recommended mitigation projects for the Hungry Horse hydroelectric project, Montana.

Project	Advanced Design	Implementation	Maintenance	Monitoring	Total Estimated Cost $
Black Bear/ Grizzly Bear conservation easements	150,000	6,778,500 or 10,846,500*	1,000,000	100,000	7,428,000 or (12,096,500)*
with fee-title	150,000				
Elk/Mule Deer	50,000	1,080,000	3,375,000	500,000	5,005,000
Bald Eagle	240,000	750,000	---	---	990,000
Waterfowl	50,000	1,188,000	200,000	---	1,438,000
Mountain Grouse	15,800	161,400	322,800	---	500,000
Terrestrial Furbearers	30,000	1,500,000	---	---	1,530,000
Aquatic Furbearers	240,000	250,000	---	---	490,000
TOTAL					$17,381,500 - 22,049,500*

* Higher value includes fee-title acquisition on 1,808 acres (Appendix D).

Table 14. Estimated annual budget (1984 dollars) for each project to implement the Hungry Horse mitigation plan.

Year	Black Bear/ Grizzly Bear *	Elk/Mule Deer	Bald Eagle	Waterfowl	Mountain Grouse	Terrestrial Furbearers	Aquatic Furbearers	TOTAL
1	150,000	50,000	80,000					280,000
2	500,000	50,100	80,000	30,000		30,000		710,000
3	500,000	50,050	80,000	134,000	15,800	10,000	80,000	869,850
4	500,000	50,050	93,750	134,000	7,336	10,000	80,000	875,136
5	400,000	50,050	93,750	134,000	7,336	10,000	80,000	775,136
6	400,000	50,050	93,750	134,000	7,336	10,000	50,000	745,136
7	300,000	50,050	93,750	134,000	7,336	10,000	50,000	645,136
8	300,000	50,050	93,750	134,000	7,336	16,300	50,000	651,436
9	300,000	50,050	93,750	134,000	7,336	16,300	50,000	651,436
10	300,000	50,050	93,750	134,000	7,336	16,300	50,000	651,436
11	300,000	50,050	93,750	134,000	7,336	16,300	-------	601,436
12-25	100,000	50,050	93,750	2,000	7,336	16,300		175,686
26-100	29,040	50,050		2,000	4,304	16,300		101,694

* low estimate; numbers would be increased by approximately $47,000 for each year for higher estimate. (See Table 13).

Table 15. Comparison of estimated costs to implement each Hungry Horse mitigation project to fee-title acquisition alternatives.*1

Recommended Project		Fee-title Acquisition		
Project	Cost	Cost($)/ Acres	Total Acre	Cost($)
Black Bear/ Grizzly Bear	**12,096,500***2	9,038	2,500	**22,595,000**
Elk/Mule Deer	**5,005,000**	7,000	1,500	**10,500,000**
Waterfowl	**1,438,000**	1,056	2,000	**2,112,000**
Aquatic Furbearers	**490,000**	2,863	2,500	**7,157,500**
Terrestrial Furbearers	**1,530,000**	13,638	1,000	**13,638,000**
Ruffed Grouse	**500,000**	1,794	1,000	**1,794,000**
Bald Eagle	**990,000**	1,000	2,000	**2,000,000**
TOTAL	**22,049,500**			**59,796,500**

*1 Overlap among projects is taken into account

*2 Represents higher of 2 estimates (see Appendix D.1)

IV. SUMMARY

This report describes the proposed mitigation plan for wildlife losses attributable to the construction of the Hungry Horse hydroelectric project. The report (Phase II) follows and relates to the specific target wildlife species loss estimates made in a previous report, Phase I (Casey et al. 1984).

In this report, mitigation objectives and alternatives, the recommended mitigation projects, and the crediting system for each project are described by each target species (or group).

Criteria were used to evaluate mitigation alternatives and to select a recommended project. These criteria included: 1) the number and kinds of species (or species groups) benefitted by an alternative; 2) consistency with the Northwest Power Act of 1980, the Northwest Power Planning Councils' Columbia River Fish and Wildlife Program and draft criteria for land acquisition; 3) consistency with the MDFWP mitigation guidelines (Appendix A); and 4) the results of interagency coordination.

For all target species, the overall mitigation objective was to replace the losses, either the numbers of animals or acres of key habitats lost. Mitigation objectives for each species (group) were established based on the loss estimates but tailored to the recommended projects. Depending on the nature of the recommended project, a mitigation accounting or crediting system was then developed.

Seven specific mitigation projects were recommended:

1) Elk/Mule Deer Winter range enhancement

2) Black Bear/Grizzly Bear spring range and travel corridor acquisition

3) Aquatic Furbearer Management

4) Terrestrial Furbearers old-growth management

5) Ruffed Grouse habitat enhancement

6) Waterfowl wetland acquisition/enhancement

7) Bald Eagle Management.

Each one of these 7 projects was designed to meet the mitigation objective for that particular species or species group. Because each project can benefit more than one target species (group), implementation of all the projects could result in more than 100% mitigation for some species. Therefore, projects were ranked and objectives modified to accomodate expected overlaps of species benefits. The resulting modified recommended mitigation

projects are the components of the final mitigation plan. The final mitigation projects with recommended time-frames, objectives, locations and species benefits are summarized in Table 16.

The approximate percent contribution of each modified recommended project to the mitigation goals of target species (groups) was estimated and summarized (Table 17). The primary purpose for estimating the percent contribution of each project to each species mitigation goals was to modify mitigation objectives so that costs for the entire mitigation package could be determined. From the estimates of the percent contribution of each project to mitigation objectives of target species (groups) (Table 17), the relative percent contributions of each project to the overall mitigation plan was determined. This was accomplished by multiplying the values in Table 17 by the qualitative impact level given to each species (group) during Phase I (Casey et al. 1984). Highly impacted species were weighted as 3, moderately impacted species were weighted as 2 and low impacted species as I. Average of the qualitative impacts for species were used for species groups. Resulting products for each project were summed and the percent contribution of each project to the overall mitigation effort calculated. The results of the procedure are illustrated in Figure 3.

Estimated costs were presented by 4 categories: advance design, implementation, maintenance and monitoring. Costs were also presented on an annual basis for the life of the project. Where projects entailed certain variables affecting costs (such as acres of land to be acquired by conservation easement or fee-title), a cost range estimate was made. A summary of the total estimated costs per project is shown below. These costs cover the entire projected 100 year life of the Hungry Horse hydroelectric project.

PROJECT	ESTIMATED TOTAL COST (1984 dollars)
Black Bear/Grizzly Bear	7,428,500 - 12,096,500
Elk/Mule Deer	3,005,000
Bald Eagle	990,000
Waterfowl	1,438,000
Terrestrial Furbearers	1,530.000
Aquatic Furbearers	490,000
Ruffed Grouse	500,000
TOTAL	17,381,500 - 22,049,500

Table 16. Summary of recommended projects making up final wildlife mitigation plan for the Hungry Horse hydroelectric project.[a]

Project	Priority	Initiation Time-Frame	Objectives	Location(s)	Other Species (Groups) Benefitted
Black Bear/ Grizzly Bear	1.1	0-3	Habitat protection on 9,038 acres via conservation easements or fee-title acquisitions	North Fork, Middle Fork, Swan River	Elk, Mule Deer, White-tailed Deer, Mountain Lion, Waterfowl, Mountain Grouse, Aquatic Furbearers, Terrestrial Furbearers, Bald Eagle, Osprey.
Elk/Mule Deer	1.2	0-3	Winter range enhancement on 18,283 acres	Firefighter Mountain, Bob Marshall, Great Bear, Other areas near Hungry Horse Reservoir	Black Bear, Grizzly Bear, White-tailed Deer, Mountain Lion, Lynx, Mountain Grouse
Bald Eagle	2.1	0-5	To better manage existing breeding, migrating and wintering bald eagle habitat	Flathead River System (north of Flathead Lake)	Aquatic furbearer, Waterfowl, Osprey
Waterfowl	2.2	0-5	To protect/enhance 1,056 acres of wetlands	Flathead Valley, Mission Valley	Aquatic furbearers, Bald Eagle, Osprey
Terrestrial Furbearers	2.3	0-5	To manage/protect 13,638 ac of old-growth forest in Northwest Montana	Swan Valley other valleys	White-tailed Deer, Black Bear, Mountain Lion
Aquatic Furbearers	3.1	0-10	To improve population and habitat management knowledge for river otter and other aquatic species	Northwest Montana	Bald Eagle, Osprey, Waterfowl
Ruffed Grouse	3.2	0-10	Enhance 1,794 ac of aspen/birch forest	Adjacent to Hungry Horse Reservoir	Elk, Mule Deer, White-tailed Deer, Mountain Lion

[a] The objectives in this table assume that accounting for expected project overlaps has been undertaken.

Table 17. The percent contribution of each final recommended project (with modified objectives) to the overall mitigation of each target species (group).

Species Group	Black Bear/ Grizzly Bear/ Project	Elk/ Mule Deer Project	Bald Eagle Project	Waterfowl Project	Terrestrial Furbearers Project	Aquatic Furbearers Project	Ruffed Grouse Project	Total Mitigation
Elk	30	70						100
Mule Deer	30	70						100
White-tailed Deer	30	40			30			100
Black Bear	80	20			10			110
Grizzly Bear	80	20						100
Mt. Lion	30	70			30			130
Aquatic Furbearers	20		10	10		60		100
Terrestrial Furbearers	6				94			100
Mountain Grouse	33	34					33	100
Waterfowl	20		10	60		10		100
Bald Eagle/Osprey	10		70	10		10		100

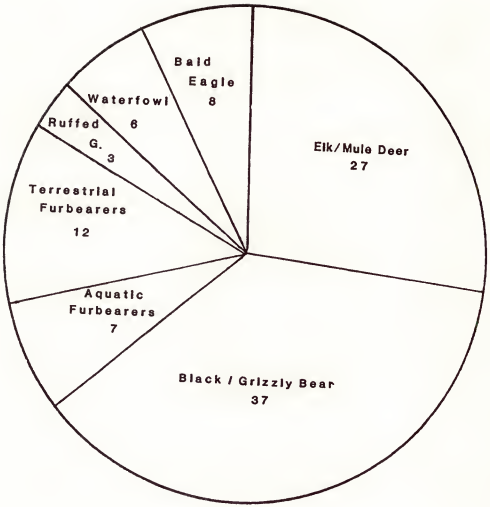

Fig. 3. The percent (%) contribution of each recommended mitigation project to the whole mitigation plan.

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APPENDIX A

May 31, 1983

MONTANA DEPARTMENT OF FISH, WILDLIFE, AND PARKS

MITIGATION GUIDELINES

When mitigation as provided by law is proposed for development projects, the Montana Department of Fish, Wildlife, and Parks shall request funding from the developer, or the appropriate agency, to conduct those studies necessary to determine impacts of the development on fish and wildlife and their habitat and to develop a project specific mitigation plan.

WILDLIFE SECTION

The principle objective of the mitigation plan shall be to mitigate within the project area impacts to wildlife and to compensate for animal losses attributable to the development project. The plan shall identify measures to maintain populations of affected species. The plan shall prescribe appropriate measures to document the implementation of the mitigation package, to monitor wildlife response to those measures, and to document the sufficiency of mitigation.

The Montana Department of Fish, Wildlife, and Parks shall request funding from the developer, or the appropriate agency, to implement, monitor, and document the mitigation measures prescribed in the mitigation plan.

Selection of mitigation measures for terrestrial species shall be determined by the following criteria:

A. The mitigation objective shall be to replace, on an animal for animal basis, animal losses attributable to the development project and to ensure the replacement of lost animal production into the future. This objective may be modified according to this priority:

   1. To replace, on an animal for animal basis, animal losses specifically attributable to the development project.

   2. To replace, on an animal for animal basis, some of the animal losses and an appropriate equivalent of animals of other species.

   3. To replace, on an animal for animal basis, an appropriate equivalent of other species.

B. Mitigation measures:

   1. The highest priority shall be assigned to the development and implementation of measures to enhance wildlife habitat on land owned by other agencies, corporations, or individuals, without the Department acquiring management authority to those lands.

      Implementation of enhancement measures shall be dependent upon cooperative agreements with the appropriate land management agencies and a land allocation compatible with mitigation objectives. The Department shall request funding for implementation of those measures, including operation and maintenance for

the life of the development project, and, when appropriate, research and development of enhancement measures.

2. If the Department cannot negotiate agreements to implement enhancement measures on lands in other ownership within a reasonable time, then the Department shall attempt to acquire management authority over lands identified in the mitigation plan. Acquisition of management authority by conservation easement, when applicable, shall have priority over acquisition by fee title from willing sellers. Lands to be acquired shall be determined by priorities established by this policy, while procedures for acquisition shall be consistent with principles outlined in the Department's statewide habitat acquisition policy. The Department shall develop a management plan for acquired lands. The Department shall request the developer, or the appropriate agency, to acquire the lands and to provide funding for development of the management plan, research and development appropriate to the management of those lands, and ongoing operation and maintenance of those lands.

3. On new projects, the Department shall request that mitigation lands be acquired at the same time as other project lands and be included in basic project costs.

C. The location of mitigation projects shall be consistent with the mitigation objectives, and be determined according to the following priority:

1. Immediate vicinity of the development project or within the annaul range of the species affected.

2. Within the county (or within a 50-mile radius) of the development project.

3. Within the corresponding Department of Fish, Wildlife, and Parks administrative region.

4. Within Montana.

D. Mitigation measures shall feature those species identified in Section A-1, 2 or 3, consistent with the mitigation objective. Those species shall have priority at all projects within location priorities Section C-1, 2, and 3. Thereafter, features species shall be determined by SCORP.

Decisions regarding acceptance or rejection of proposed mitigation recommendations shall be made with full public knowledge, input, and review.

Approved by:_____

Date:_____

APPENDIX B

Appendix B. Example wetland rating form.

WETLAND RATING SYSTEM

WETLAND NAME:_____ I.D. No._____ DATE_____

LOCATION (general)_____ LEGAL T_____ R_____ S_____

DESCRIPTION (general)_____

TOPOGRAPHIC CONFIGURATION*_____

* 1 = slough
2 = oxbow lake
3 = pothole lake/pond
4 = artificial impdmnt.
5 =
6 =
7 =
8 =

CLASSIFICATION#_____

1 =
2 =
3 =
4 =
5 =

HABITAT DESCRIPTIONS

Upland types:	ACRES	% TOTAL	SPECIES COMPOSITION (dominant)

Wetland types:

RANKING CRITERIA: 3 = High 2 = Medium 1 = low

Upland Nesting Cover	_____ x (wt)	_____ =	_____
Presence/No.islands	_____ x (wt)	_____ =	_____
Emergent Nesting Cover	_____ x (wt)	_____ =	_____
Brood Habitat Quality	_____ x (wt)	_____ =	_____
Amount of open water	_____ x (wt)	_____ =	_____
Open in winter	_____ x (wt)	_____ =	_____
Vulnerability to draining/ developments	_____ x (wt)	_____ =	_____
Edge (1)/ Area ratio	_____ x (wt)	_____ =	_____
Other Target spp. benefited _____	_____ x (wt)	_____ =	_____
_____	_____ x (wt)	_____ =	_____
Total	_____ x (wt)	_____ =	_____

PHOTOS:

COMMENTS/ SKETCH:

APPENDIX C

Appendix C. Summation of target species expected to be benefitted by each of the recommended mitigation projects, Hungry Horse.

Target Species	Loss Value	Elk/Mule Deer	Black Bear/ Grizzly Bear	Aquatic Furbearer	Terrestrial Furbearer	Ruffed Grouse	Waterfowl	Bald Eagle
Elk	3	x	x			x		
Mule Deer	1	x	x			x		
White-Tailed Deer	2	x	x		x	x		
Black Bear	3	x	x		x			
Grizzly Bear	3	x	x					
Mtn. Lion	1	x	x		x	x		
Auatic Furbearer	2.1		x	x			x	x
Terrestrial Furbearer	1.5	x	x		x			
Mountain Grouse	2.3	x	x			x		
Waterfowl	1.6		x	x			x	x
Bald Eagle	1.5		x	x			x	x
TOTAL		8	11	3	4	5	3	3

APPENDIX D

Appendix D. Derivation of estimated cost projections (1984 dollars) for advance design, implementation, maintenance, and monitoring requirements for 7 recommended wildlife mitigation projects, Hungry Horse hydroelectric project, Montana.

D.1 Black Bear/Grizzly Bear Project
(conservation easement/fee-title on 9,038 acres)

	Estimated Cost[a]	Estimated Cost[b]
Advance Design:		
2 years (to identify, select, and rank potential acquisitions; to negotiate agreements, set-up appraisals, coordinate activities between agencies)	100,000	100,000
Contracted services (appraisals, conservation easement consultants, legal fees)	50,000	50,000
Implementation:		
Acquisition of conservation easements on 9,038 acres @ $750/acre	6,778,500	—
or		
Acquisition of conservation easements on 7,230 acres (80% target) @ $750/acre plus		5,422,500
Fee-title acquisition of 1808 acres @ $3,000/ac.		5,424,000
Maintenance:		
Fence repair, enhancement projects (i.e. nesting structures, burns cultivation, etc.) on lands:		
- protected by conservation easement @ $5,000/year x 100 years	500,000	
- acquired by fee-title @ $10,000/year x 100 years		1,000,000
Monitoring:		
To inspect properties each year for life of project:		
- for conservation easements (assumed by agency with easement)	0	
- for monitoring projects on fee-title acquisitions every 5 years @ $5,000 for 100 years (20 x 5,000)	100,000	
TOTAL ESTIMATED COSTS	7,428,500	12,096,500

[a] assuming 100% easement acquisition

[b] assuming 80% easement and 20% fee-title acquisition

D.2 Elk/Mule Deer-Winter Range Enhancement
(18,283 acres targeted for management)

	Estimated Costs ($)
Advance Design:	
1 year to design project(s); coordinate activities between agencies; develop plans, schedules, maintenance and monitoring requirements; facilitate implementation	50,000
Implementation:	
Vegetation treatments on 9,000 acres (approximately 50% targeted acreage for enhancement) @ $125.00/ac[a] for 360/ac year = $45,000/year for next 24 years	1,080,000
Maintenance:	
Repeated treatments every 25 years; $125.00/ac x 360 ac/year x 75 years x $45,000/year.	3,375,000
Monitoring:	
Animal/vegetation response monitoring to implementation and maintenance activities (yearly) $5,000/year for 100 years	500,000
TOTAL ESTIMATED COST	5,005,000

[a] Represents an average cost for all treatments including activities such as broadcast burning, slashing, clearing with mechanical equipment, planting, etc. over a variety of seasons and conditions.

D.4 Waterfowl
(Acquisition of 1056 acres of prime waterfowl habitat)

	Estimated Costs ($)
Advance Design:	
1 year to develop specific enhancement/management plans; select areas for acquisition; coordination	50,000
Implementation:	
Acquire 50% (528 ac) wetlands via conservation easements @ $500/ac.	264,000
Acquire 25% (264 ac) uplands via fee-title acquisition @ $2,000/ac.	528,000
Acquire 25% (264 ac) uplands via conservation easement @ $1,500/ac.	396,000
Maintenance:	
Vegetation treatments, nest structures, fences, etc., repair every year at $2,000/year x 100 years.	200,000
Monitoring:	
None	0
TOTAL ESTIMATED COST	1,438,000

D.3 Bald Eagle Project
(management and protection of habitat)

	Estimated Costs ($)
Advance Design:	
3-year investigation @ $80,000/year	240,000
Implementation:	
Apply management recommendations in Flathead River system (conservation easements on 1,000 ac @ $750/ac.	750,000
Maintenance:	
None	0[a]
Monitoring:	
None	0[a]
TOTAL ESTIMATED COST.	990,000

[a] Costs and responsibilities to be assumed by U.S. Forest Service, U.S. Fish and Wildlife Service, and Montana Dept. of Fish, Wildlife and Parks.

D.5 Mountain Grouse
(Enhance 1794 acres)

	Estimated Costs ($)
Advance Design:	
6 months to design and develop plan, coordination.	15,800
Implementation:	
Vegetation treatments on 60% acreage (.60 x 1794 ac) = 1076 ac @$150/ac[a]	161,400
Maintenance:	
Repeated treatments on 1076 ac @ $75/ac x 4 (for every 25 years)	322,800
Monitoring:	
Can be done as part of elk/mule deer projects	0
TOTAL ESTIMATED COSTS	500,000

[a] Average cost for mechanical treatments and planting.

D.6 Terrestrial Furbearers
(Old-growth management on 13,638 acres)

	Estimated Costs ($)
Advance Design:	
8 months to design and develop projects; coordinate with private and public landowners; develop management plans.	30,000
Implementation:	
Compensate school trust or other landowners for deferred sales @ $3/ac for 100 years on 5,000 ac	1,500,000
Management of other areas in old-growth assumed by various agencies landowners or costs recovered from allowed timber sales.	0[a]
Maintenance:	
None.	0[a]
Monitoring:	
None.	0[a]
TOTAL ESTIMATED COSTS	1,530,000

[a] Costs and responsibilities to be assumed by Montana Dept. of Fish, Wildlife and Parks and/or other entities.

D.7 Aquatic Furbearers
(River Otter Project)

	Estimated Costs ($)
Advance Design:	
3-year investigation @ 80,000/year	240,000
Implementation:	
Apply recommended management strategies in northwest Montana.	250,000
Maintenance:	
None	0[a]
Monitoring:	
None	0[a]
TOTAL ESTIMATED COSTS	490,000

[a] Costs and responsibilities to be assumed by the Montana Dept. of Fish, Wildlife and Parks.

APPENDIX E

COMMENTS RECEIVED DURING THE FORMAL REVIEW PERIOD

RECEIVED
JAN 4

LIST OF ADDRESSEES

Hungry Horse/Libby Mitigation Plans

Mr. James Flynn, Director
Attention: Mr. John Mundinger
Montana Department of Fish,
Wildlife, and Parks
1420 East Sixth Avenue
Helena, Montana 59620

Mr. John Wood, Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services
Federal Building, Room 3035
316 North 26th Street
Billings, Montana 59101

Mr. Don Barschi, Coordinator
Fish and Wildlife Program
U.S. Forest Service
P.O. Box 7669
Missoula, Montana 59807

Mr. Martin Montgomery
Wildlife Coordinator
Northwest Power Planning Council
Statehouse
Boise, Idaho 83720

Mr. George Robertson, General
Attention: Mr. Ed Mains, NPD-PL-ER
U.S. Army Corps of Engineers
North Pacific Division
P.O. Box 2870
Portland, Oregon 97208

Mr. Alan Christensen
Kootenai National Forest
Route 3, Box 700
Libby, Montana 59923

Mr. William Lloyd, Regional Director
Attention: Mr. D. Woodworth
Bureau of Reclamation
550 West Fort Street
P.O. Box 043
Boise, Idaho 83724

Mr. Robert Hensler
Flathead National Forest
P.O. Box 147
Kalispell, Montana 59901

Mr. Thruman H. Trosper, Chairman
Flathead Basin Commission
Rt 1, Box 43
Ronan, Montana 59864

Ms. Pam Barrow
Fish and Wildlife Coordinator
Pacific Northwest Utilities
Conference Committee
520 SW. Sixth Avenue, Suite 505
Portland, Oregon 97204

Mr. Joe Felsman, Chairman
Confederated Salish and Kootenai Tribes
of the Flathead Indian Reservation
P.O. Box 278
Pablo, Montana 59855

Ms. Amelia Trice, Chairwoman
Kootenai Tribal Council
P.O. Box 1002
Bonners Ferry, Idaho 83805

JMeyer:ay (WP-PJS-455ON/4549N)

Montana Department of Fish, Wildlife & Parks

DEC 27 1984

Helena, Montana
December 17, 1984

Mr. Jim Meyer
Bonneville Power Administration
POB 3621
Portland, Oregon 97208

RECEIVED
JAN 4 1985

Dear Jim,

The Montana Department of Fish, Wildlife and Parks has completed the wildlife impact assessments and mitigation plan for the Hungry Horse hydroelectric project. The mitigation plan presents seven recommended wildlife projects. If implemented, these projects would accomplish sufficient mitigation for the losses of wildlife and wildlife habitats attributable to Hungry Horse Dam.

Our process was comprehensive and responsive to the Columbia Basin Fish and Wildlife program under the Northwest Power Act of 1980. Each selected project benefits several wildlife species. Generally, habitat enhancement will occur in close proximity to Hungry Horse Dam and on lands owned by other cooperating entities. Acquisitions were specified only when other alternatives were not feasible. Preparation of both the impact assessment and the mitigation plan was closely coordinated with the other responsible management agencies.

We believe that this plan is an innovative approach to wildlife mitigation. Most of the proposed projects are considerably more cost effective than acquisition alternatives. Yet, they should produce greater wildlife benefits to be maintained for the life of the project.

I support adoption of the mitigation plan for Hungry Horse hydroelectric projects. I also commit the Montana Department of Fish, Wildlife and Parks to fully cooperate with the implementation of this plan.

Sincerely,

James W. Flynn
Director

ftm

JAN 0 2 1985

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ecological Services
Federal Building, Room 3035
316 North 26th Street
Billings, Montana 59101-1396

RECEIVED
JAN 4 1985

IN REPLY REFER TO:

ES

December 27, 1984

Mr. James R. Meyer
Wildlife Program Area Manager
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Dear Mr. Meyer:

We have received the following documents from you for formal review: "Wildlife and Wildlife Habitat Mitigation Plan for Libby Hydroelectric Project" and "Wildlife and Wildlife Habitat Mitigation Plan for Hungry Horse Project." In addition, Messrs. Larry Lockard and Ray Washtak represented the Fish and Wildlife Service at a meeting concerning these reports on December 18, 1984, and also met on December 19, 1984, with Ms. Gael Bissell to discuss the reports.

The Fish and Wildlife Service (FWS) concurs with the reported findings of the Montana Department of Fish, Wildlife, and Parks (MDFWP). Full implementation of the subject plan should provide equitable mitigation and wildlife-related losses at the Libby and Hungry Horse facilities.

The FWS intends to actively cooperate with MDFWP to assist in implementation of these mitigation plans.

Sincerely,

John D. Wood
Field Supervisor
Ecological Services

cc: Director, Montana Department of Fish, Wildlife, and Parks, Helena, MT
Forest Supervisor, Kootenai National Forest, Libby, MT
Forest Supervisor, Flathead National Forest, Kalispell, MT
District Engineer, Corps of Engineers, Portland, OR
Regional Director, Bureau of Reclamation, Boise, ID
Regional Director, USFWS, Denver, CO (HR)
Larry Lockard, NWMFWC, Kalispell, MT

United States Department of the Interior
BUREAU OF RECLAMATION
PACIFIC NORTHWEST REGION
FEDERAL BUILDING & U.S. COURTHOUSE
BOX 043-550 WEST FORT STREET
BOISE, IDAHO 83724

JAN 02 1985

IN REPLY
REFER TO: PN 150
565.

DEC 28 1984

James R. Meyer
Wildlife Program Area Manager
Biological Studies Branch
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Dear Mr. Meyer:

Subject: Comments on Hungry Horse Wildlife Mitigation Plan

We wish to compliment you and the Montana Fish, Wildlife, and Parks Department on an excellent piece of work regarding loss statements and the mitigation plan. We also appreciate the way the state has kept us informed during the development of these documents.

We do have some reservations regarding the cost per animal in the mitigation plan. If one projects the Hungry Horse costs to the other powerplants in the Columbia River system, the total would appear to be prohibitive. The high cost per animal regarding bears is an outstanding example of this issue. We believe there is a need to prioritize and come up with some more defendable cost figures. We also believe the significance of habitat overlap among species needs to be made clearer to the reviewers.

We look forward to further review through the Power Planning Council. Thank you for the opportunity to comment.

Sincerely yours,

L.W. Lloyd

Regional Director

cc: Montana Department of Fish, Wildlife, and Parks, Kalispell, Montana,
Attention: Tom Hay
Project Superintendent, Hungry Horse, Montana